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SHIPBOARD NON-TACTICAL AUTOMATED DATA PROCESSING
(SNAP)
RESYSTEMIZATION: AN ALTERNATE APPROACH

by

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The next generation of Shipboard Non-tactical Automated Data Processing (SNAP) systems is now being designed. A historical review of the development of the original generation of shipboard non-tactical computer systems (SUADPS) shows an evolutionary rather than a revolutionary approach to shipboard logistics system development.

Current non-tactical information system (IS) development practices are resulting in multiple systems that perform the same function. The Intermediate Maintenance Management System (IMMS), Maintenance Resource Management System (MRMS) and Naval Aviation Logistics Command Management Information System (NALCOMIS) have all been developed for intermediate level maintenance management.

Development of the next generation shipboard non-tactical logistics information system must stress a standardized integrated maintenance approach. Control of non-tactical information system development should be exercised by the Navy's Deputy Chief of Naval Operations for Logistics to ensure adherenct to logistic support policy and standard system development.

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Abstract of

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PREFACE

This paper is designed to show the historical development of shipboard non-tactical automated data processing systems. In presenting a historical overview of automated logistics system development, it is hoped that the Navy may learn from mistakes made in past shipboard computer development efforts.

Primary sources for this paper come from 25 years of professional articles published in the Navy Supply Corps Newsletter. Conversations with personnel in the SNAP program office, OP-04, and NAVMASSO provided direction and assistance in understanding the past and current shipboard automated logistics development efforts.

The bibliography is not limited to shipboard non-tactical automated data processing systems, but covers the Navy's stock point (UADPS) and inventory control point (UICP) automated systems as well. Resource documentation of U.S. Air Force and U.S. Army automated logistics systems are included to provide starting reference points for any follow-on projects.

The alternate system proposed is not fully developed in the paper. The intent of the alternate proposal is to highlight the need to develop a configuration based integrated maintenance system. Additionally a maintenance management approach that spans organizational, intermediate and depot level maintenance systems is advanced.

TABLE OF CONTENTS

LIST OF FIGURES

SHIPBOARD NONTACTICAL AUTOMATED DATA PROCESSING

(SNAP)

RESYSTEMIZATION: AN ALTERNATE APPROACH

CHAPTER I

INTRODUCTION

The Problem. The current central processing unit (CPU) or main computer hardware for the Shipboard Nontactical Automated Data Processing (SNAP) II system is nearing the end of manufacturer's support. Several peripheral components for the SNAP I system are also reaching the end of their service lives. The Space and Naval Warfare Systems Command, and the Naval Supply Systems Command have jointly entered into concurrent projects to replace and upgrade selected hardware and software systems now running under the SNAP I and SNAP II systems.

The Space and Naval Warfare Systems Command's effort is directed to the resolicitation of hardware under the title of "SNAP III". The initial software design for incorporation with the SNAP III architecture is the Shipboard Uniform Automated Data Processing System (SUADPS) resystemization project under the sponsorship of Naval Supply Systems Command.

The redesign of the Supply inventory and financial processing software under the SUADPS resolication independent of a total shipboard nontactical automated data processing system to include organizational and intermediate level maintenance capabilities repeats the original development errors and the inherent problems that have plagued the current generations of SNAP I and SNAP II systems.

CHAPTER II

HISTORY OF SHIPBOARD NON-TACTICAL AUTOMATED DATA PROCESSING

Development of automated supply and maintenance systems for Naval ships has occurred in five distinct phases. The first three phases closely followed the development of similar automated supply systems for Naval supply activities ashore, but the development and implementation of these first three phases of shipboard systems normally followed the shore system development by three to five years.

The first phase of shipboard supply automation began with the introduction of Electronic Accounting Machines (EAM) punch card systems in 1958. The first systems were IBM 402 equipment installed on AKS type ships.[1] Follow-on EAM punch card systems were developed and installed on afloat units using IBM 402/407 and UNIVAC 1004 equipments.

The development and fielding, in 1963, of the Uniform Automated Data Processing System (UADPS) for ashore supply management at the Navy's stock points led to the initial development of the shipboard logistical computer system, based on the UNIVAC U1500 analog computer.

The second phase of shipboard non-tactical automated systems began with first installation of the U1500 computer system in June 1966 onboard the USS AMPHION (AR 14).[2] This first U1500 system was designated as the Interim Tender System.

The first aircraft carrier U1500 installation was onboard USS ESSEX, also in 1966. The carrier system was designated as the Interim Carrier System. These first installations and the implementations that followed, were emulations of existing EAM systems that provided an upgrade from existing system capabilities in that the Master Stock Record was created and updated on magnetic tape. All other functions performed on the interim systems were punch card based.[3] The U1500 computer system designated as the AN/UYK-5(V) shipboard computer consisted of a Central Processing Unit (CPU) with a static Random Access Memory (RAM) of 12 Kilobytes, later upgraded to 16 kilobytes of memory, a combination card reader/puncher, a high speed printer, and magnetic tape drives.

The third phase in shipboard automation was the fielding of the fully tape oriented Uniform Tender System onboard USS SHENANDOAH and the Uniform Carrier System onboard USS INDEPENDENCE in 1968.

The Uniform Tender System and the Uniform Carrier System were developed to create a computerized system that would improve afloat supply inventory control and financial management and be more responsive to user requirements. The major objectives for the Uniform Tender and Uniform Carrier Systems were:

> -To provide information on stocked material to shipboard management in more accessible and useable form than is currently available with the existing manual, EAM and Interim U-1500 systems.

-To provide the capability for daily updating of records, applying improved reorder decision rules and generating comprehensive and meaningful data for management review.

- To improve supply responsiveness to user demands at the point of issue.

-To provide for automatic validating and processing of supply aids.

-To provide for the collection and maintenance of more definitive data for use in automatically adjusting stock levels.

-To improve report and record accuracy and reduce clerical errors by mechanically validating all input data.

-To provide the capability for pertinent exchange of data in automated format between forces afloat and the shore establishment.

-To provide for the maximum practical file automation with exception transactions that must be manually reviewed.

-To provide for automatic application of change notice action and maintenance of stock number cross reference changes tailored to the ship's inventory.

-To provide for physical inventory procedures with maximum flexibility in the selecting and scheduling of physical inventory and location validation.

-To provide for automatic preparation of required reports for financial summaries, order and shipping time analysis, supply effectiveness, and other management reports.

-To provide for automatic preparation of periodic reports to administer departmental budgets and OPTAR funds.

-To provide Maintenance Collection Data for processing 3-M reports.[4]

The Uniform Tender System was developed for implementation on Tenders and Repair Ships (AD/AR/AS classes). This system as well as the Carrier Uniform System, the Interim U1500 EAM emulation system and the ashore Uniform Automated Data Processing System (UADPS) was developed by the Navy Bureau of Supplies and Accounts/Navy Supply Systems Command's Fleet Material Support Office (FMSO). The design and implementation of the shipboard U1500 based automated data systems was performed by the Fleet Material Support Office's Fleet Assistance Group, Atlantic (FAGLANT).

The centralization of design and implementation of automated data systems was a development of lessons learned from the second generation of shore based automated supply systems. These systems were the first computer based supply systems, that implemented the same basic operating systems and procedures that had been running on the EAM systems. These first generation 'true' computer systems were developed on a decentralized basis by each activity. As a result of each activity designing and implementing their own system control of was lost over uniform design.[5]

The centralized design of automated data systems at what is designated as a Central Design Agency (CDA), gives the Navy a level of control of system design and development. The Navy Supply Systems Command recognized the need for centralized design in the development of the Uniform Automated Data Processing System (UADPS) and the afloat Uniform Automated Data Processing Systems. As described by Rear Admiral B.H. Bieri, SC, USN, then Chief of the Supply Corps in 1968: "There are, of course, side benefits to this effort. When a centrally designed system finally reacts, it is complete and uniformly applied. Over-all implementation actually takes less time than individually designed systems."[6]

Centralized design and control of the Navy's automated logistics computer systems also allows conformance with mandated Department of Defense (DOD) logistic Military Standards (MILSTANDARD) programs. Figure number 2-1 shows some of the mandated DOD MILSTANDARD programs that impact logistic system design and implementation.

The Uniform Tender System and the Uniform Carrier System were converted in 1971 to the Shipboard Uniform Automated Data Processing System (SUADPS). This system was a refinement of the preceding Tender and Carrier system and was still based on the AN/UYK-5(V) UNIVAC U1500 tape-based computer system. The Shipboard Uniform Automated Data Processing System (SUADPS), was still divided into two distinct systems, SUADPS-207 for all '207 class' accounting ships such as tenders and repair ships, and SUADPS-EU for 'end use ships', carriers. The first ships to receive these systems were the USS SIMON LAKE, SUADPS-207 and the USS WASP, SUADPS-EU.

While the Uniform Tender System, the Uniform Carrier System and the Shipboard Uniform Automated Data Processing System End Use (SUADPS-EU) and Shipboard Uniform Automated Data Processing 207 Class (SUADPS-207) were tape-based systems, they still relied heavily on punch card technology. Punch cards were the primary input interface that these systems relied on.

The SUADPS systems provided the following application programs: inventory control, stock management, financial,

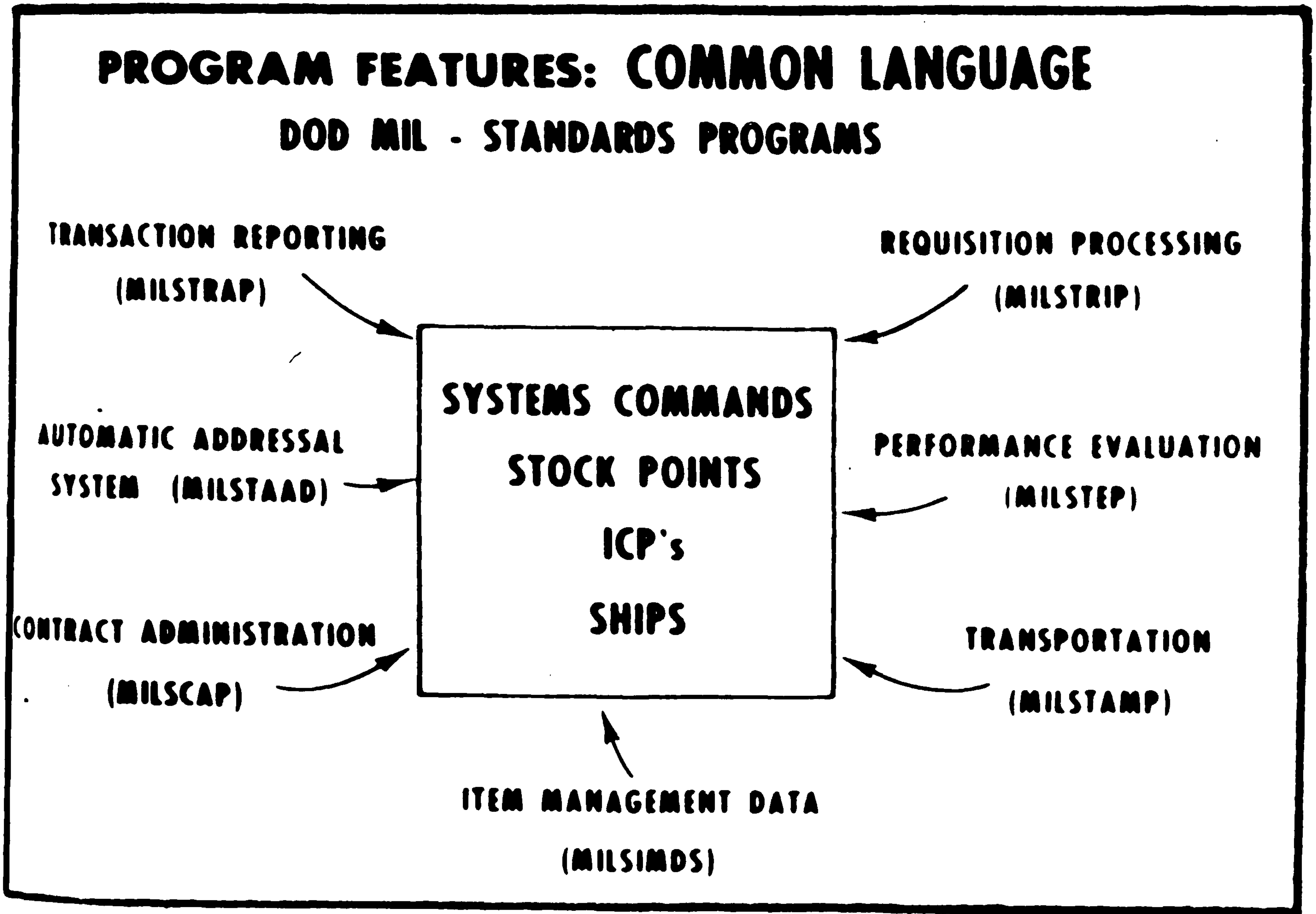

FIGURE 2-1

Source "Uniform Automated Data Processing Systems for Supply Management", Navy Supply Corps Newsletter, October 1968, p 23 management aids, 3-M maintenance data collection (MDC) and utility programs.

"SUADPS has been designed as a modular system and is based on the concept that each component of a program is self-contained and performs only a specified function. A master executive component regulates the actions of all other components."[7] Figure 2-2 shows the 1975 existing and proposed population of SUADPS.

The fourth phase of the shipboard non-tactical automated data processing systems consisted of the hardware upgrade and conversion of the AN/UYK-5(V) UNIVAC U1500 computer to the Honeywell DPS-6 computer system. This hardware conversion allowed the conversion of the Shipboard Uniform Automated Data Processing System (SUADPS) from a tape oriented, batch processing system to an on-line disk oriented system. The major benefit of this conversion was that it allowed on-line access to data in SUADPS to users outside the Automated Data Processing Center onboard ship.

As a side issue, during the development of the SNAP I and later SNAP II systems, the Fleet Material Support Center was developing as the Trident Logistics Data System for support of the new Trident Class of submarines and their refit bases. This effort was sponsored by Commander Naval Sea Systems Command code PMS-396. The Trident Logistic Data System was designed from the beginning as a unique system for the total logistics support of the Trident class of submarines and their refit facilities.

SUADPS 1975

CURRENT AND PROPOSED POPULATION

	AVIATION					SURFACE/SUBSURFACE							
						MLSF							OTHER
	CVA		LPH	MAG	LHA	AD	AR	AS	AS(FBM)	AFS	AO/AP		MISC
ADPE	407	UYK-5	UYK-5	UYK-5	UYK-7	UYK-5	UYK-5	UYK-5	UYK-5	UYK-5	402	L8200	MINI
Present Installations	1	14	7	16	-	9	5	6	5	7	8	1	2
1978 Projected Installations	-	16	7	17	5	9	5	6	5	7	UNK	UNK	150 Est
Present Supply Systems	EAM -	EU -	EU -	EU -	EU -	207 -	207 -	207 -	207 -	207 UNREP	224	224 -	R&D -
Other Systems	3-M S 3-M A	3-M S 3-M A Locals	3-M S 3-M A Locals	Locals	ASIS 3-M S 3-M A NIPS	3-M IMMS Locals	3-M IMMS Locals	3-M IMMS Locals	3-M IMMS Locals	Locals	-	-	R&D
1980 Projected ADPE	-	UNSPECIFIED THIRD GENERATION ADPE											
1980 Projected Installations	-	16	7	17	5	10	5	7	5	7	37		263

EU = SUADPS-EU, 207 = SUADPS-207, 224 = CL 224 Accounting, S = Surface, A = Aviation
ASIS = Amphibious Support Information System, NIPS = Naval Intelligence Processing System

FIGURE 2-2

SOURCE "ADP AFLOAT SYSTEMS--AN OVERVIEW OR THE STORY OF SOME NEAR MIS's" NAVY SUPPLY CORPS NEWSLETTER, MARCH/APRIL 1975, P 6

The Trident LDS was designed as a maintenance based system to aid in patrol-refit cycle maintenance and support and to provide a maintenance based configuration management system for the weapon system. The philosophy of the Trident LDS design and implementation will be discussed in Chapter III.

SNAP I consisted of three shipboard configurations (Figure 2-3) and one configuration for naval air stations for aviation maintenance. Descriptions of the three shipboard configurations are as follows:

> Hardware for Configuration A, now being installed under Phase II, consists of 3 inter-connected sub-systems: a processor, a mass-storage sub-system, and a local peripheral sub-system. Configuration A does not add new software but supports current batch operations though emulation of existing software. It adds CRTs to replace card punch machines.
>
> Configuration B will have Configuration A components plus at least two remote peripheral sub-systems with additional terminals and character printers. New software development for Configuration B is underway at NAVMASSO, the Central Design Activity for all SNAP software. This new software will include the following:
>
> Shipboard Uniform Automated Data Processing System Real-Time (SUADPS-RT). A single, comprehensive supply and financial accounting system for all large ships.
>
> Intermediate Maintenance Management System-Real Time IMMS-RT). A means of collecting maintenance data and providing management information at Navy intermediate maintenance sites.
>
> Pay and Personnel Administrative Support System-Source Data System Afloat (PASS-SDSA). A means of handling all personnel and military pay information for forces afloat.
>
> Organizational Maintenance Management System-Real Time (OMMS-RT). A data collection and maintenance management information system geared to organizational level maintenance, which is performed by a member of the ship's own crew.
>
> Configuration C is designed for afloat aviation units that require a large ADP capacity to support SUADPS-RT, IMMS-RT and the Naval Aviation Support

SNAP I CONFIGURATIONS

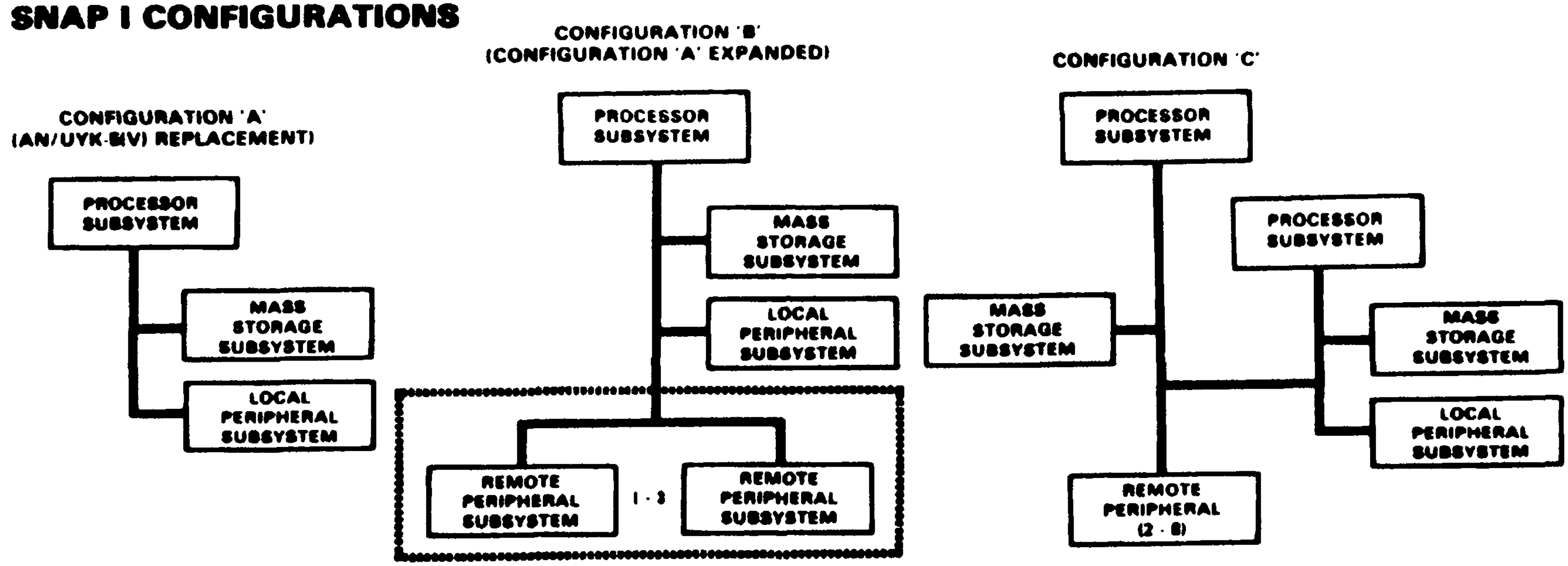

FIGURE 2–3

Source: "SNAP", Navy Supply Corps Newsletter, July/August 1984, p 15

Management Information System (NALCOMIS). Configuration C will have an additional processor, mass storage, and remote peripheral sub-systems.[8]

Figure 2-4 provides the current status of software implementation of the various existing versions of the SUADPS system. Current plans call for all existing SNAP I/SUADPS systems to be upgraded to SUADPS release 3.0 which will allow terminal users to access SUADPS data on a real-time basis.

Maintenance system development for the Shipboard Non-tactical Automated Data Processing systems are covered in chapter three.

The SUADPS and SNAP I systems were developed for and installed on the Navy's largest ships. With the development of smaller, more powerful mini-computers, space and cost requirements, that prohibited the installation of SUADPS on smaller combatants, were no longer constraints to installing automated logistics systems onboard the smaller ships.

The development of the Shipboard Non-tactical Automated Data Processing (SNAP) Phase II logistics system was initiated in the early 1970s. David Taylor Naval Ship Research and Development Center, conducted as study aboard two ships in 1974 and 1975. The study, known as DEAS Information Networks Study Phases I and II completed in 1975 and 1978 respectively, formed the informational database for the shipboard requirements and ship to shore data flow required to implement a total shipboard logistics system.

January 90

CURRENT AIS PROJECTS STATUS

LIFE CYCLE SUPPORT

CLASS	NBR OF ACTIV	SUADPS Pre-SNAP	SUADPS Pre-Rel 3	SUADPS Rel 3	IMMS Pre-SNAP	IMMS Pre-Rel 3	IMMS Rel 3	OMMS Pre-SNAP	OMMS Pre-Rel 3	OMMS Rel 3	ADM Pre-Rel 2	ADM Rel 2	ADM Rel 3
AD	9	7	7	2	8	4	1	0	0	0	8	1	0
AFS	7	7	7	0	7	0	0	0	4	0	7	0	0
AR	2	1	1	1	2	1	0	0	0	0	2	0	0
AS	12	12	12	0	7	4	5	0	0	0	12	0	0
CV	9	3	3	6	6	4	1	0	2	2	2	6	0
CVN	6	2	2	4	2	0	2	0	2	2	1	3	0
LHA	5	4	4	1	4	0	0	0	3	1	4	0	0
LHD	1	0	0	1	0	0	0	0	0	1	0	1	0
LPH	7	4	4	3	5	0	0	0	1	2	4	2	0
MALS	12	0	0	12	0	0	0	0	0	0	0	0	0
OTHER *	17	6	4	6	6	0	1	0	0	0	1	0	0
SIMA	4	2	0	0	0	0	0	0	0	0	0	0	0
T-AFS	3	3	2	0	0	0	0	0	0	0	0	0	0
TOTALS	94	51	46	36	47	13	10	0	12	8	41	13	0

* OTHER:

DIRSSP Washington DC
NAVSUBSUPPFAC New London CT
NSD Subic Bay
NTC San Diego CA
NARDAC Pearl Harbor HI
COMNAVAIRLANT Norfolk VA
COMSUBLANT Norfolk VA
FLETRACEN Norfolk VA
NAVSCSCOL Athens GA
FCDSSA San Diego CA
NARDAC San Diego CA
NARDAC Norfolk VA
NETPMSA Pensacola FL
NARDAC San Francisco CA
MRASTU Belle Chase LA
MATSG Meridian MS
COMNAVSURFRESFOR New Orleans LA

FIGURE 2-4

SOURCE Naval Space and Warfare Systems Command, "SNAP I Fleet Program Review, 30 January 1990," SNAP Program Office, Washington: 1990

While the SNAP II system studies and hardware/software prototyping were being conducted, several fleet units acquired microcomputers and developed their own shipboard non-tactical automated data programs. Most notable of these systems was the system developed on USS KING (DDG 41), by Lieutenant Harry McDavid, SC,USN. The system titled "Micro-KING" was built around a commercially available Televideo 806 microcomputer system using Control Program/Microcomputer (CP/M) programming language and Aston-Tate "dBase II" database application software. The system was assembled for under $10,000 (Commanding Officer approval authority in 1982-83). The Micro-KING system provided automation of supply financial reports, requisition status reports, requisition processing, and disbursing functions.[9]

The Navy's answer to the needs of the smaller ship's SNAP II from its inception had a broader goal than the supply/financial and limited maintenance support provided by the Standard Uniform Shipboard Automated Data Processing System (SUADPS) and limited applications developed by shipboard personnel using microcomputers. SNAP II's initial design envisioned total integrated shipboard non-tactical automation of all logistic and administrative functions. Functional areas to be initially included in the SNAP II system were; administration personnel records, medical and dental records, disbursing, food service management records, retail operations management, implementation of the Navy's Maintenance and

Material Management (3-M) system (Planned Maintenance System and Material Data Collection) and Consolidated Shipboard APL List (COSAL) as on-line databases.[10] Figure 2-5 provides a list of SNAP II software application programs.

The SNAP II system was designed to meet the following requirements:

> Be operable and maintainable afloat without specialized data processing personnel
> Be capable of sufficient growth to satisfy foreseeable non-tactical information processing requirements aboard ship.
> Be software and data compatible with the AN/UYK 5(V) replacement system (SNAP I).
> Be capable of off-line data exchange with interfacing automatic data processing and communications systems.
> Have a projected serviceable life in the shipboard environment sufficient to achieve economic payback thresholds.
> Have sufficient security protection capability to prevent unauthorized access to ship's data.[11]

SNAP II hardware was acquired through a minority small-business set aside contract under the Small Business Administration Section 8(a) program. The contract was awarded in November 1981 and the winning contractor was Systems Management America (SMA) of Norfolk, Virginia. The Snap II system hardware designated the AN/UYK-62(V) was designed to be fielded in four configurations: small, small (submarine), medium, and large. The primary differences between the configurations being the number of peripherals and disk storage capacity.[12] The primary SNAP II hardware elements are: a Harris super-microcomputer H-300 for the main processor with a fixed hard disk drive system, a high speed line printer and remote

SNAP II SOFTWARE APPLICATION PROGRAMS

Organizational Maintenance Management Subsystem (OMMS)

- **Current Ship's Maintenance Project**
- **Work Package Processing**
- **Approval Cycle Processing**
- **Automatic 4790.Ck Form Generation**
- **On-line Trouble Log**
- **Preventive Maintenance Subsystem (PMS)**
- **Measure**
- **Automated Technical Document File**
- **Navy Technical Information Presentation System (NTIPS)**
- **Supply/Financial Management Subsystem (SFM)**
- **Automated COSAL**
- **On-line Stock Record File, Material Outstanding File, Status File, Cross Reference File**
- **Inventory Management, Including Reorder Review**
- **Financial Module (OPTAR, Department Budget)**
- **NAVSUP 1250 and Requisition Generation**
- **AVCAL (Helo DETS)**
- **Food Service and Retail Operations Modules**
- **Disbursing**
- **Mobile Logistics Support Force (MLSF)**

Administrative Data Management Subsystem (ADM)

- **Personnel Administration Module**
- **Watch, Quarter and Station Bill**
- **Berthing Bill**
- **Division Officer's Notebook**
- **Career Counselor Module**
- **Medical Module**
- **Word Processing (MUSE)**
- **Mailing Lists**
- **Social Roster**
- **Recall Bill**
- **PASS/SDSA**

FIGURE 2-5

Source: "SNAP", Navy Supply Corps Newsletter, July/August 1984, p. 17

"dumb" terminals. The first prototype installation of the SNAP II system was on USS SIDES (FFG 14) in October 1982.[13] By May 1984, 24 Surface Force Atlantic (SURFLANT) ships had SNAP II installed with five additional SURFLANT ships scheduled to receive the SNAP II system in Fiscal Year 1984.[14]

The initial system design for the SNAP II system proved to be overly ambitious. The disbursing, retail operations management and food service management modules were removed from the SNAP II minicomputer system and developed on stand-alone microcomputers. Among other problems, the access time for data retrieval proved to be excessive and acted as a deterrent for initial users of the SNAP II system. While the Harris H300 minicomputer provided sufficient processing power to handle the installed software applications, the disk access controller proved to be the limiting factor in system utilization.

A sixth phase of shipboard non-tactical automated data processing is currently under development. SNAP III consisting of phased hardware replacement for the SNAP I and SNAP II systems is under development by Commander, Naval Space and Warfare Command (SPAWAR) code PMW-164, the Shipboard Non-tactical Automated Data Processing systems management office. A further development in this sixth phase of shipboard automated logistics is the Naval Supply Systems Command's (NAVSUP) Shipboard Uniform Automated Data Processing System (SUADPS) resystemization project under NAVSUP code 048's direction.

The hardware replacement effort is driven by the two problems. First, many peripheral equipment for the SNAP I system, specifically the line printer, are reaching the end of serviceable life. Secondly the Harris H300 minicomputer which is the central processing unit of the SNAP II system will no longer be supported by the manufacturer after 1992. These factors provide an urgency for the SNAP project office to provide new hardware to the fleet.

The SNAP III system is being designed as the technology refreshment of the SNAP I, SNAP II, and the paper ship concept. The functional goals that SNAP III is being designed to meet are:

1) accommodate information growth as a result of CALS

2) improve/maintain the level of data integrity

3) increase accessibility to the system (connectivity) and information (flexibility)

4) enable easier incorporation of technological advances

5) anticipate and accommodate user information needs growth

6) develop an open architecture, centrally managed data base on file servers.

Figure 2-6 provides a depiction of proposed SNAP III system architecture concepts.

The SUADPS resystemization project is an effort by the Naval Supply Systems Command to review current operating procedures for inventory and financial management with a view to

SYSTEM ARCHITECTURE CONCEPT

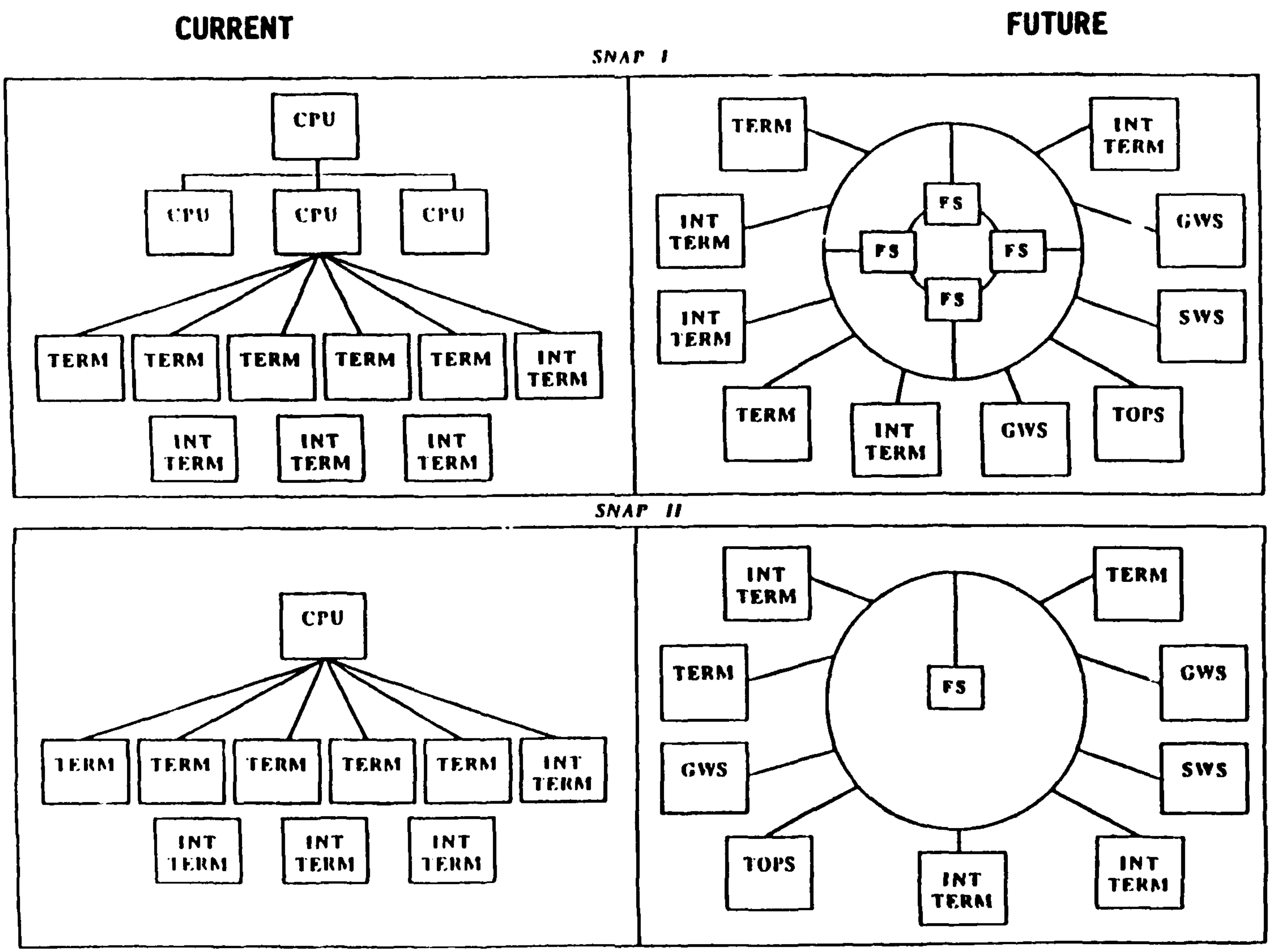

FIGURE 2-6

Source: OP 43, "Ship Intermediate Maintenance Management in the 1990's", OP-43 briefing for the SNAP program Review, 30 January 1990 projected manning and responsibility allocation of Supply Corps officer and enlisted personnel in the next two decades. This review of current operating procedures is a "bottom-up and top-down review" of how the Supply Corps inventory and financial management operating policies and procedures could and should be changed to reflect the realities of reduced budgets and supply billets in the 1990s and the twenty-first century.

In the beginning of the new decade of the 1990s the development of a new Standard Shipboard Non-tactical Automated Logistics system faces many challenges. Hardware replacement and SUADPS resystemization are but two of many issues to be managed in the development of a new system. Perhaps the most important issue that must be addressed in the development of the new "SNAP III" system is the issue of central design and control of hardware and application programs for shipboard logistics systems.

An article in the March/April 1988 edition of the Navy Supply Corps Newsletter, shows a decentralized system of Information Resource Management (IRM) with Navy Type Commanders (TYCOM), third echelon commands controlling either Surface, Aviation or Submarine forces on either the East of West coasts of the United States, having the authority to develop and implement shipboard non-tactical automated data systems to supplement or enhance the SNAP I/II systems. Examples of these TYCOM developed systems are: Commander Submarine Fores Atlantic (COMSUBLANT) has developed a micro-computer LOGMARS bar-coding system. Commander, Naval Air Forces Atlantic (COMNAVAIRLANT) has several non-tactical Automated data processing systems/applications under development. Among the COMNAVAIRLANT initiatives are enhancements of the COMSUBLANT LOGMARS bar-coding system developed as the Integrated Bar-coding System (IBS), and research and development efforts with optical storage devices.[15]

These development efforts on part of the varying Type Commanders if not controlled, may lead "back to the future" in non-tactical automated data processing systems, that the Navy found itself in the early 1960s where non-standard systems were the norm rather than the exception.

1. "SUADPS -- Navy's Shipboard Uniform Automatic Data Processing System," Don Jahn, W.T. Bobbitt, and F.N. Siburt, Navy Supply Corps Newsletter, January 1972, pp. 74-76.

2. "Supply Management Afloat," D.R. Jahn and J.Q Lewis, Navy Supply Corps Newsletter, June 1970, p. 22.

3. "SUADPS -- Navy's Shipboard Uniform Automatic Data Processing System," Don Jahn, W.T. Bobbitt and F.N. Siburt, Navy Supply Corps Newsletter, January 1972, p.74.

4. "USS SHENANDOAH--Automated Supply Systems Afloat." p.18, Navy Supply Corps Newsletter, June 1968.

5. "Projected Logistics Information Systems", G.E. Moore, II, Navy Supply Corps Newsletter, June 1969, pp. 7-8

6. "Shifting the Supply System's Sights," B.H.Bieri, Navy Supply Corps Newsletter, June 1968, p.33.

7. "SUADPS--Navy's Shipboard Uniform Automated Data Processing System", Don Jahn, W.T. Bobbitt, and F.N. Siburt, Navy Supply Corps Newsletter, January 1972, p. 75.

8. Robert B. Alderman and Janice Lawrimore, "SNAP." Navy Supply Corps Newsletter, July/August 1984, pp. 15-16.

9. Harry F. McDavid, "Micro-*KING*." Navy Supply Corps Newsletter, May/June 1983, pp. 15-16.

10. D.A. Davies, "Progress Report on SNAP II." Navy Supply Corps Newsletter, July/August 1983, p. 10.

11. Robert B. Alderman and Janice A. Lawrimore, "SNAP." Navy Supply Corps Newsletter, July/August 1984, p. 16.

12. Robert A. Alderman and Janice A. Lawrimore, "SNAP." Navy Supply Corps Newsletter, July August 1984, p. 16.

13. D.A.Davies, "Progress Report on SNAP II." Navy Supply Corps Newsletter, July/August 1983, p. 10.

14. Robert A. Alderman and Janice A. Lawrimore, "SNAP." Navy Supply Corps Newsletter, July/August 1984, p. 17.

15. Terry Tooke, "Fleet Automation." Navy Supply Corps Newsletter, March/April 1988, pp. 3-4.

CHAPTER III

AUTOMATED SHIPBOARD MAINTENANCE MANAGEMENT SYSTEMS

Benjamin S. Blanchard, in his book Logistics Engineering and Management, defines maintenance as:

> maintenance includes all actions necessary for retaining a system or product in, or restoring it to a serviceable condition. Maintenance may be categorized as corrective or preventive maintenance.[1]

The Navy's current formal maintenance program dates to 1964 with the publication of Office of Naval Research Report Serial T-170, "A Survey of Information Requirements for Navy Maintenance and Material Management."[2] This report led to the establishment of the Maintenance and Material Management Program, commonly referred to as the 3-M program. The Maintenance and Material Management Program was divided into two parts, the Planned Maintenance System (PMS), and the Maintenance Data Collection System (MDC).

The Planned Maintenance System (PMS) was developed and implemented to provide scheduled maintenance to perform preventative maintenance on selected equipment to reduce or avoid component or total equipment failure during operation.

The Maintenance Data Collection System (MDC) was designed to gather information on maintenance actions and to collect maintenance related material consumption. This system was the earliest maintenance system implementation on shipboard non-tactical automated data processing systems and was included in the Uniform Tender System and Uniform Carrier System operating on the AN/UYK-5(V) UNIVAC U1500 computer system.

Since the installation of these first MDC maintenance sub-systems on the Uniform Tender and Uniform Carrier Systems in 1968, maintenance sub-systems in various forms have been included in all successive shipboard non-tactical automated data systems. The scope and complexity of the shipboard maintenance systems have increased since 1968.

The Intermediate Maintenance Management System (IMMS), development was sponsored by Naval Sea Systems Command code CLD, with the Navy Management Systems Support Office (NAVMASSO) acting as the Central Design Agency for the development of the program. The project was initially developed as IMMS II running on the Shipboard Uniform Automated Data Processing System (SUADPS) U1500 computer. IMMS was developed to provide selected SNAP I shipboard intermediate maintenance facilities (AR, AS, and AD) with a production and man-hour accounting management package. The IMMS-RT program was developed from the beginning as a phased development software system designed to interface, initially through a tape input, to the SNAP I SUADPS system. Successive IMMS enhancements have resulted in a real time interface with the SNAP I SUADPS system under IMMS release 3.0. The first implementation of IMMS-RT was onboard USS McKEE in 1982.

Currently 22 shipboard IMAs are running either IMMS release 2.0 or release 3.0. All existing IMMS sites are scheduled to receive IMMS release 3.0.

The Maintenance Resource Management System (MRMS), developed under the sponsorship of Naval Sea Systems Command (NAVSEA) Code PMS-331, with PMS-331 also acting as the Central Design agency, was designed to consolidate three existing shore based intermediate maintenance management systems. The three systems that MRMS replaced are: Area Maintenance Management Information System (AMMIS) developed By Naval Surface Forces Atlantic (SURFLANT), Waterfront Maintenance Management System (WMMS) developed by Naval Surface Forces Pacific (SURFPAC), and Submarine Maintenance Management Information System (SMMIS). MRMS was designed to run on the Honeywell DPS-6, the standard SNAP I shipboard computer hardware. Development of this system was begun in 1986, and was first implemented at SIMA San Diego in the spring of 1988. The first shipboard installation of MRMS was onboard USS DIXON (AS-37) in January 1990. Currently all Shore Intermediate Maintenance Activities (SIMA) with the exception of the Nuclear Submarine Support Facility (NSSF) New London, run MRMS. Future implementations of MRMS are planned in the first and second quarters of FY 1990.

The Organizational Maintenance Management System (OMMS) was developed by the Navy Management Systems Support Office (NAVMASSO) under the sponsorship of Naval Sea Systems Command code CLD in 1981. The Organizational Maintenance Management Systems (OMMS) originally developed under the title Logistics Support Center (LSC) was first implemented onboard USS RANGER. OMMS is designed to give SNAP I ships an automated organizational level maintenance planning, scheduling and data collection system. Currently 20 SNAP I ships have OMMS installed. The system, originally fielded as a stand alone system running on the SNAP I hardware, is being integrated with the SNAP I Intermediated Maintenance Management System (IMMS) through an Afloat System Interface, (ASI). The Afloat System Interface, is an electronic data transfer capability designed to allow the Organizational and Intermediate level maintenance management systems to share data.

A further development in the Organizational level maintenance systems is the development of Micro-OMMS (MOMMS). This system, also developed by NAVMASSO, is designed to give non-SNAP ships such as tugboats and Landing Craft, Utility (LCUs) an organizational level maintenance management system based on a mini-computer (Personal Computer).

The SNAP II system, designed and developed by NAVMASSO, uses what is referred to as the Integrated Logistics Management system (ILM) to aid in maintenance and configuration management. The SNAP II system provides a modular, integrated database linking configuration files, maintenance files and supply parts database.

The SNAP II ILM allows for maintenance data collection using electronic (on-screen) maintenance action forms (OPNAV Form 4790/2K) and configuration change reporting (OPNAV Form 4790/CK). The ILM also builds the ships Consolidated Shipboard Maintenance Program (CSMP) file which details which maintenance actions have been deferred due to lack of material or shipboard capabilities.

Two additional shipboard maintenance systems have been developed and fielded, the Naval Aviation Logistics Command Management Information System (NALCOMIS) and the Trident Logistic Data System (LDS). Both systems were designed to be used in the afloat and ashore maintenance environments.

The naval air maintenance system was established by OPNAVINST 4790.2, the Naval Aviation Maintenance Program (NAMP). The shipboard and air station automation program designed to implement NAMP is the NALCOMIS program. NALCOMIS, was developed by the Fleet Material Support Office under the functional sponsorship of Commander, Naval Air Systems Command code PMA-270, the NALCOMIS project management office. The project was initiated in January 1977.[3] NALCOMIS provides an integrated database for aviation Organizational maintenance Activities, Intermediate Maintenance Activities and Supply Support Centers aboard carriers and Naval and Marine Corps Air Stations.

The objectives of the NALCOMIS program are, "...to increase aircraft material readiness by improving repairable turn-around time and to provide improved visibility of assets."[4] The system was designed to operate on the SNAP I afloat hardware and was first fielded at Marine Air Group 14, Marine Corps Air Station (MCAS) Cherry Point, North Carolina in 1983.[5] All carrier aviation intermediate maintenance departments have the NALCOMIS program installed and operating on the SNAP I systems.

The last shipboard maintenance system to be discussed, is perhaps the most comprehensive integrated logistics system currently fielded by the Navy, the Trident Logistics Data System (LDS). The Trident LDS is not a single program but an interactive group of seven sub-program modules that covers not only organizational, intermediate and depot level maintenance, but include supply support, configuration management and overhaul and refit support for the Trident weapon system. Figures 3-1 and 3-2 provide diagrams of the integrated Trident LDS system network.

The Trident Logistics Data System was initiated in November 1971 under Naval Sea Systems Command (NAVSEA) code PMS-396, Project Office for the Undersea Long Range Missile System (ULMS).[6] The Central Design Agency responsible for design and development of the Trident LDS is the Fleet Material Support Office.

The Trident LDS was designed from the beginning as a maintenance based system. The design philosophy of the system was to support the integration of shipboard maintenance and supply support requirements into the broader planning and upkeep programs required to support the Trident's patrol cycle. The

TRIDENT Logistic Data System Family Tree

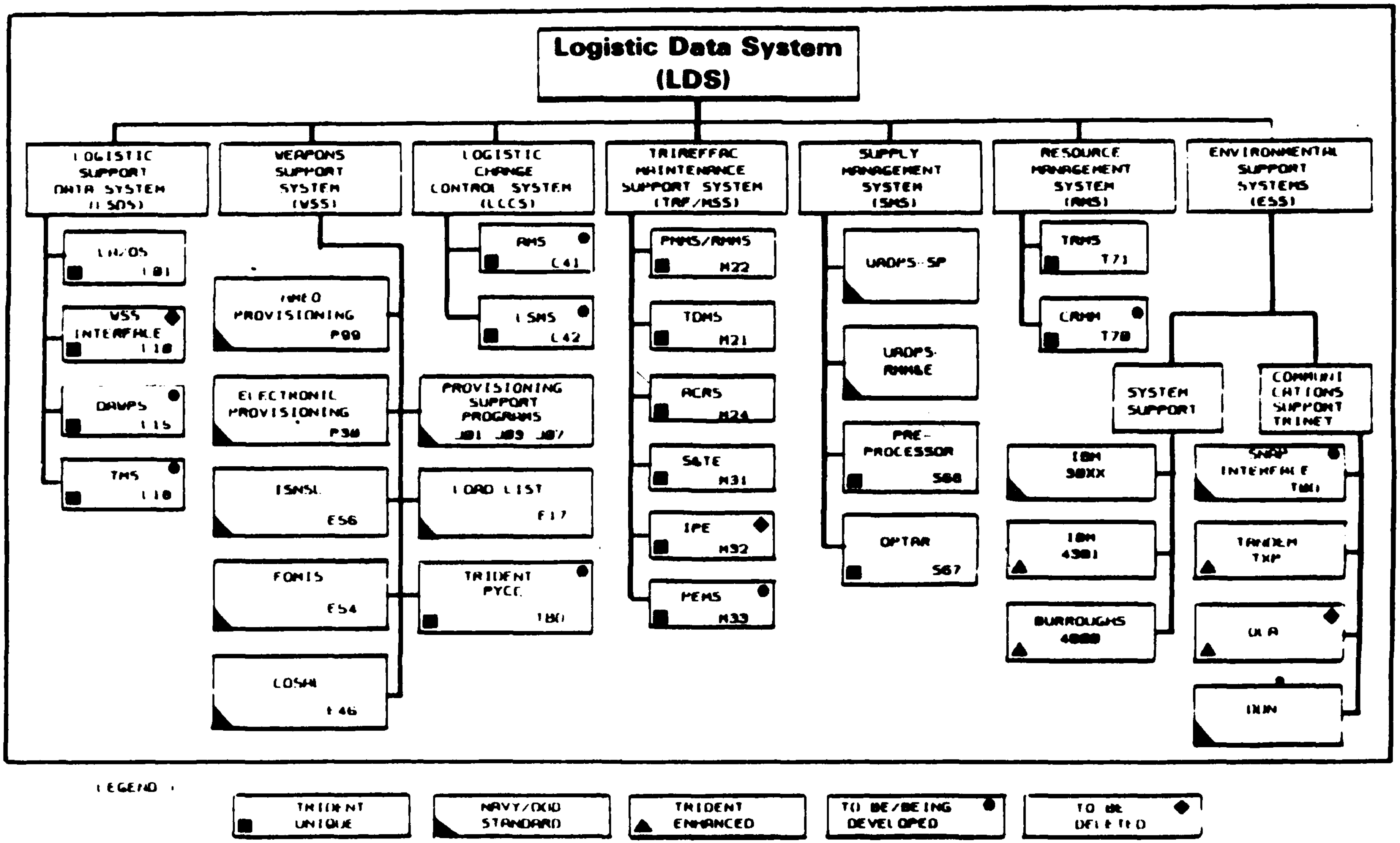

FIGURE 3-1

Source: "FMSO and 15 Years of Trident System Support," Navy Supply Corps Newsletter, January/February 1987, p. 22

TRIDENT LDS Operational Support

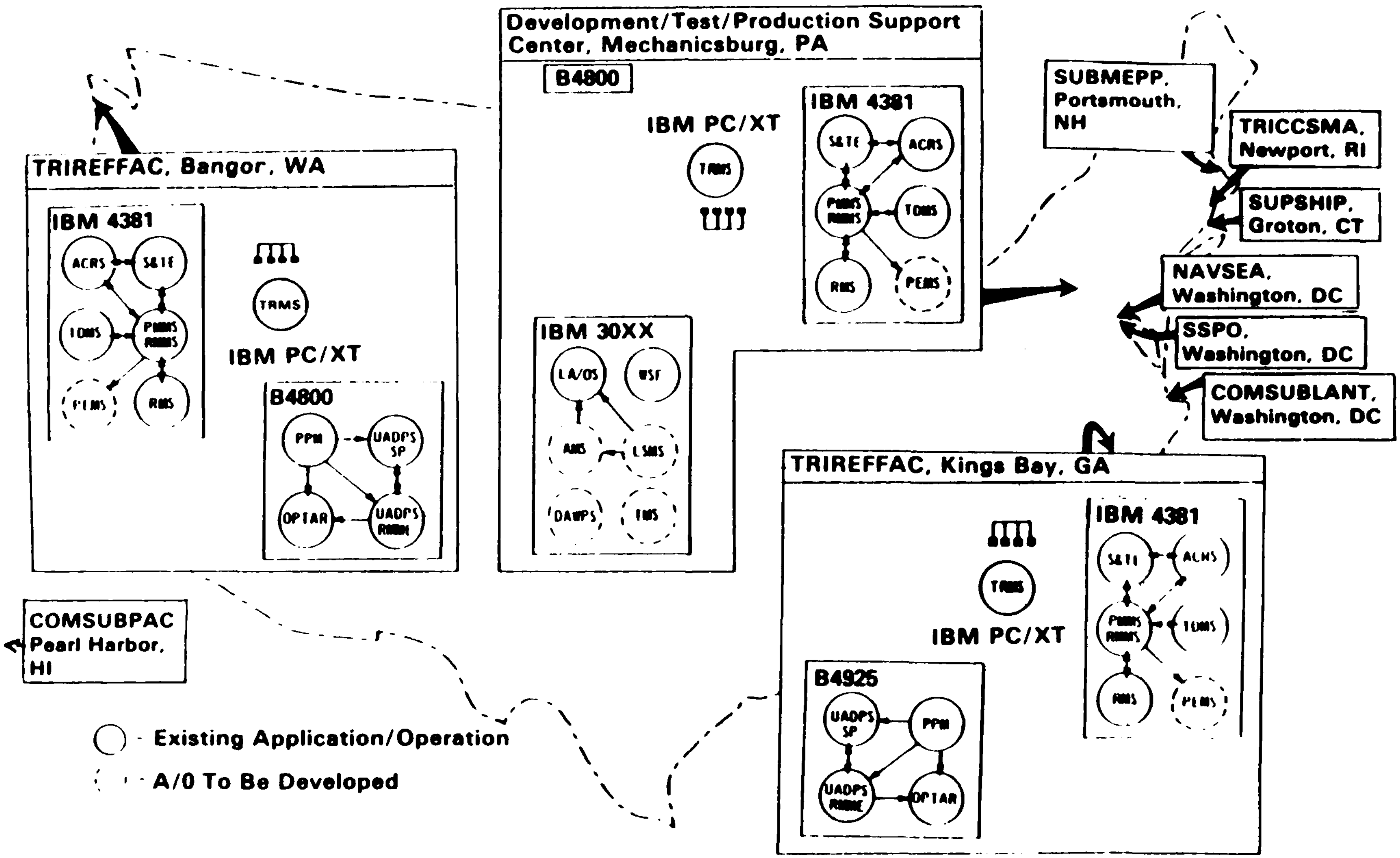

FIGURE 3-2

Source "FMSO and 15 Years of Trident System Support," Navy Supply Corps Newsletter, January/February 1987, p. 20.

system was designed to made use of existing automated systems such as the Uniform Automated Data Processing System (UADPS) for Supply Stock Point support, by developing front end interfaces for the Trident LDS, which allowed the Trident LDS to operate and exchange data with those systems.

The Trident Refit Planned Maintenance Management System/Refit Maintenance Management System (TRF/MMS) was designed to automate the maintenance support operations at the Trident Refit Facilities. Taking data compiled from the onboard logistics data system and planned refit maintenance data provided by the Refit Facility, the TRF/MMS module provides the identification of logistic resource requirements for a refit period. It also provides data collection that provides maintenance management reports, including data required to support the Maintenance and Material Management (3-M) system Maintenance Data Collection System (MDC).

The seven maintenance systems described above; IMMS, MRMS, OMMS, MOMMS, SNAP II ILM, NALCOMIS and Trident LDS, compose the universe of current Hardware System Command (HSC) sponsored automated shipboard maintenance systems. As can be expected with seven separate maintenance systems, redundance does exist. The IMMS and MRMS programs in particular are redundant efforts, started as separate systems for intermediate maintenance management and were sponsored by different program management offices within the Naval Sea Systems Command. Just how much redundancy exists among the seven maintenance systems is open to speculation. Chapter V describing an alternate approach for the SNAP III program will discuss a maintenance design philosophy which could result in the reduction of duplication of maintenance systems.

1. Benjamin S. Blanchard, Logistic Engineering and Management, (Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1986) p. 17.

2. Lawrence A. Minnaugh, "3-M Yesterday...Today... Tomorrow." Navy Supply Corps Newsletter, July/August 1983. p. 8.

3. Darrell D. Dempster, "NALCOMIS an Update," Navy Supply Corps Newsletter, July 1981, p. 14.

4. Darrell D. Dempster, "NALCOMIS--The System for the 80s." Navy Supply Corps Newsletter, February 1980, p. 13.

5. Darrell D. Dempster, "Nalcomis an Update," Navy Supply Corps Newsletter, July 1981, p. 16.

6. D. K. Anderson and R. T. Johnson, "Trident Submarine Logistics Data System," Navy Supply Corps Newsletter, January 1982, p. 4.

Chapter IV

LOGISTIC AND MAINTENANCE ORGANIZATION RELATIONSHIPS

The numerous organizations involved in the non-tactical logistics information systems development are systematic of a larger problem facing the Navy today: control of information systems development. The Navy's policy of allowing the Headquarters Systems Commands exercise independent logistics (ILS) management allows the duplicate development of Information Systems, especially non-tactical information systems. This chapter will review the functional and resource relationships of the Shipboard Non-tactical Automated Data Processing program office. The review of this one project will show the multiple organizations that are commonly involved in development of non-tactical information systems in the Navy.

While the SNAP Program Office is directly responsible for the hardware procurement for the Shipboard Non-tactical Automated Data Processing systems, it also has oversight responsibilities of the software systems developed to operate on that system. The SNAP Program Office, however, does not directly control the requirements or the design of the software modules developed to run in the SNAP hardware. Various functional managers serve as "executive agents" to determine the functional requirements for the sub-systems that make up the SNAP software system. Figure 4-1 shows a matrix of information system sponsors and functional area managers for the various functions running on the SNAP hardware.

The Naval Supply Systems Command serves as the functional manager for the inventory control and shipboard financial management software modules for the SNAP I and SNAP II systems. OP-43 is the functional requirements manager for the shipboard organizational and intermediate maintenance software module for the SNAP systems.

Aviation maintenance management systems and their interface with the SNAP I system is provided by Naval Air Systems Command as the functional manager for the NALCOMIS system. OPNAV-01 provides functional requirements and guidance for administrative and personnel sub-system modules.

Through this diversity of functional managers, the SNAP Program Office must try to coordinate efforts in software system development without having the authority or power to halt duplicate systems development. A primary case in point is the development of two intermediate level shipboard maintenance management systems cited in Chapter III, the Intermediate Maintenance Management System (IMMS) and the Maintenance Resource Management System (MRMS).

The Intermediate Maintenance Management System (IMMS), sponsored by the Naval Sea Systems Command code CLD (NAVSEA-CLD), was developed by the Navy Management Systems Support

FUNCTIONAL MANAGEMENT STRUCTURE

INFORMATION SYSTEM SPONSOR	FUNCTIONAL AREA MANAGER	FUNCTION
OP-41	NAVSUP 04	ORGANIZATIONAL SUPPLY
OP-41	NAVSUP 04	REISSUE SUPPLY
OP-43	OP-43	ORGANIZATIONAL MAINTENANCE
OP-05	NAVAIR	AVN MAINT ORG/INTERMEDIATE
OP-43	OP-43	INTERMEDIATE SURFACE MAINTENANCE
NACVOMPT	SUP 04	FINANCIAL ACCOUNTING
OP-92	NAVCOMPT	JUMPS

FIGURE 4-1

Office (NAVMASSO) to provide shipboard intermediate maintenance facilities (AR, AS, and AD) as a production and man-hour accounting management package. The Maintenance Resource Management System (MRMS), developed under the sponsorship of Naval Sea Systems Command (NAVSEA)Code PMS-331, with PMS-331 also acting as the Central Design Agency, was designed as an intermediate maintenance facility workload manager for the shore based Ship Intermediate Maintenance Activities (SIMA).

These competing systems have proponents among the varying Fleet Commander and Type Commander staffs. OP-043, as the formal functional manager for shipboard maintenance systems, has proposed that the MRMS program be adopted as the fleet standard intermediate maintenance management program for afloat intermediate surface and non-Trident submarine activities and Shore Intermediate Maintenance Activities (SIMA).

The naval aviation establishment has developed its own intermediate maintenance management program designed to operate on the SNAP I Honeywell DPS 6 hardware. The Naval Aviation (NALCOMIS) system was developed under Commander Naval Air Systems Command (NAVAIRSYSCOM) code PMA-270 sponsorship, with the Fleet Material Support Office (FMSO) as the Central Design Agency (CDA). This system was designed to meet the maintenance management needs for both carrier-based and ashore-based Air Intermediate Maintenance Departments (AIMD).

Along with the various functional managers described above, the SNAP Program Office also must coordinate its efforts with the policy guidance and direction provided by both the Navy's Information Resource Management Office (OP-941) and the Navy's Non-tactical ADP Policy Committee. Figure 4-2 shows the current program management structure for the SNAP program.

The position of OP-941 as the Requirements Officer for the SNAP program places the Navy's Information Resource Management (IRM) office in the position of being the resource sponsor for the SNAP program.

PROGRAM MANAGEMENT STRUCTURE

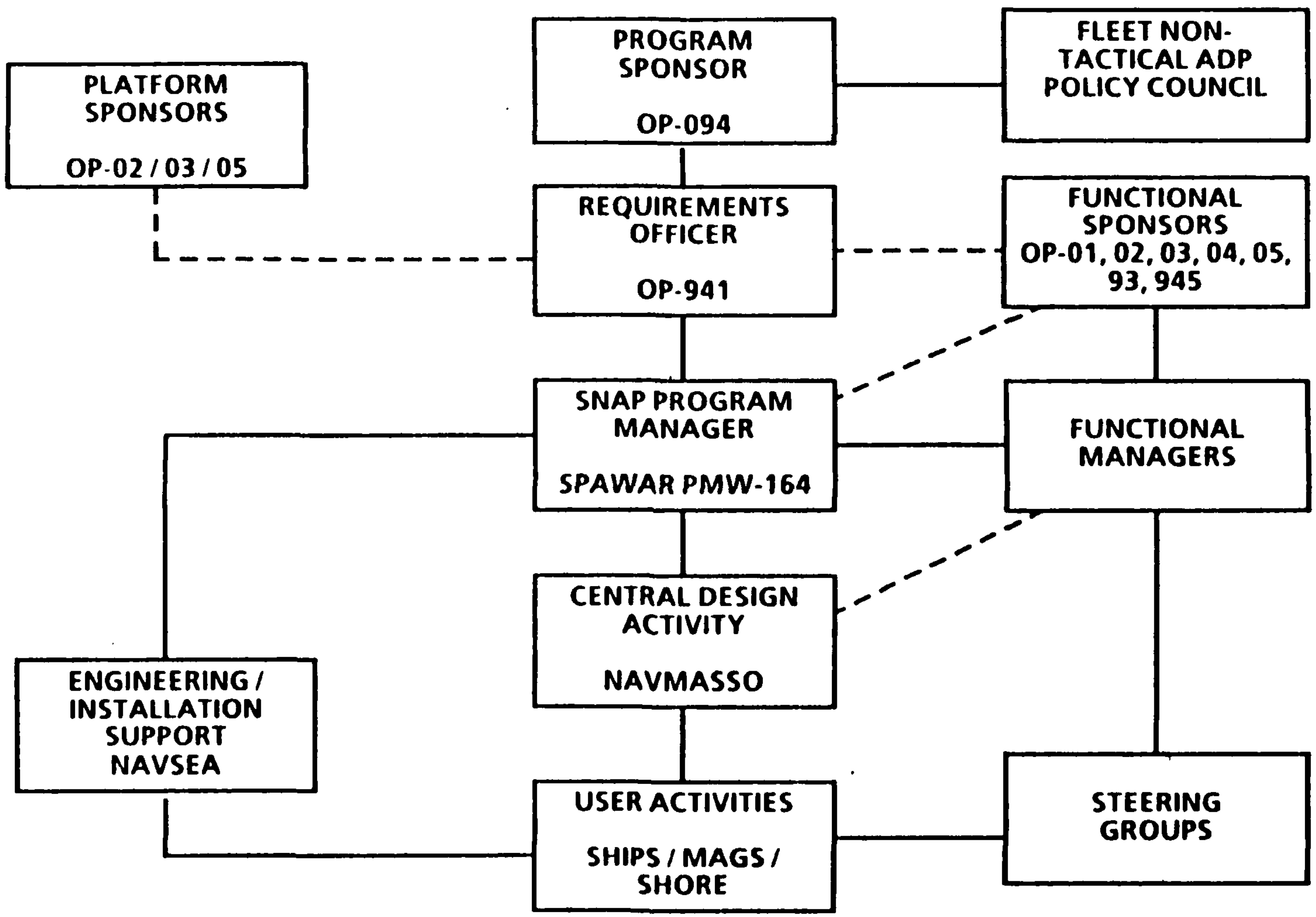

FIGURE 4-2

SOURCE SPACE AND NAVAL WARFARE SYSTEMS COMMAND, "SNAP PROGRAM MANAGEMENT", Briefing by the SNAP Program Office, Washington, [illegible]

CHAPTER V

ALTERNATIVE SNAP III DEVELOPMENT PLAN

This proposal is intended to offer an alternate path of development for the "SNAP III" system development. It rests on the integration of program development and management responsibilities in a single Project Manager devoted to hardware and software resystemization of the existing SNAP I and SNAP II systems. This proposal also assumes that a single Navy Central Design Agency (CDA) will be responsible for design, programming development and fielding of the "SNAP III" system.

The "SNAP III" system should be a maintenance centered logistics system incorporating organizational maintenance, intermediate maintenance, inventory management, financial management and personnel database modules. Administrative databases, word processing and accountable functions, (including Food Service Management, Retail Operations Management, and Disbursing) while being available on smart terminals should not be part of the logistics network.

The next generation of shipboard non-tactical logistics computer systems needs to establish the weapons platform's configuration as the baseline for development of the new system. The Ship Configuration Logistics Support Information System (SCLSIS) database developed by NAVSEASYSCOM and the Navy Supply

Systems Command provides the tool for interrelated configuration management for weapon platforms. Configuration is the key and drives the requirements for organizational and intermediate maintenance, onboard repair parts and organizational financial needs.

Currently, configuration, the key element of maintaining the proper inventory of job skills, technical/maintenance data and repair parts, is not being controlled by the personnel responsible for the equipment on board the ship - the work centers. The NAVSEA established configuration managers perform this task for a class of ships.

Work center personnel are responsible for submission of the OPNAV form 4790/CK Configuration Change Report for organizational maintenance that changes the ship's configuration, and for reviewing the OPNAV form 4790/CK being submitted by intermediate and depot activities that change the ship's configuration. This requirement for review and submission of the OPNAV form 4790/CK does not adequately place the burden of responsibility for maintaining current, accurate configuration data upon the shoulders of the work center assigned to maintain and support the installed equipment.

The problem with the existing configuration management policy is the time delay from equipment installation to receipt of a proper COSAL and adequate parts support. Because of the time delay imposed by the current configuration review and documentation procedures, a time lag of over 24 months from submission of a OPNAV form 4790/CK to receipt of spare parts is not uncommon. The time delay from installation of new equipment to formal acknowledgement of the configuration change by way of the SPCCNOTE 4440.1, is normally six months. Figure 5-1 shows the current flow of configuration change reports.

With such time delays between installation of equipment and receipt of proper repair parts support, there is little incentive for the work center to take an active interest in ensuring that the configuration file is accurately maintained.

By implementing a few changes to the way, configuration data is processed, the time delay of incorporation of a new equipment into the ship's COSAL can be reduced from six months to a matter of days. Also, repair parts support can be improved by at least six months. Figure 5-2 shows the proposed data flow changes.

By allowing the ship to enter the new equipment into the COSAL at the time of installation, the technical documentation for repair part support is immediately available to the technician. Also, by having the Naval Sea System Centers on the Atlantic and Pacific directly order the NAVSEA funded repair parts for the ship, after validation of the configuration change, will reduce the time lag in receipt of those parts onboard.

Moving from configuration to maintenance, definition of installed equipment repair philosophy (piece part repair, remove and replace) determines the maintenance requirements in terms of

CURRENT CONFIGURATION CHANGE SYSTEM

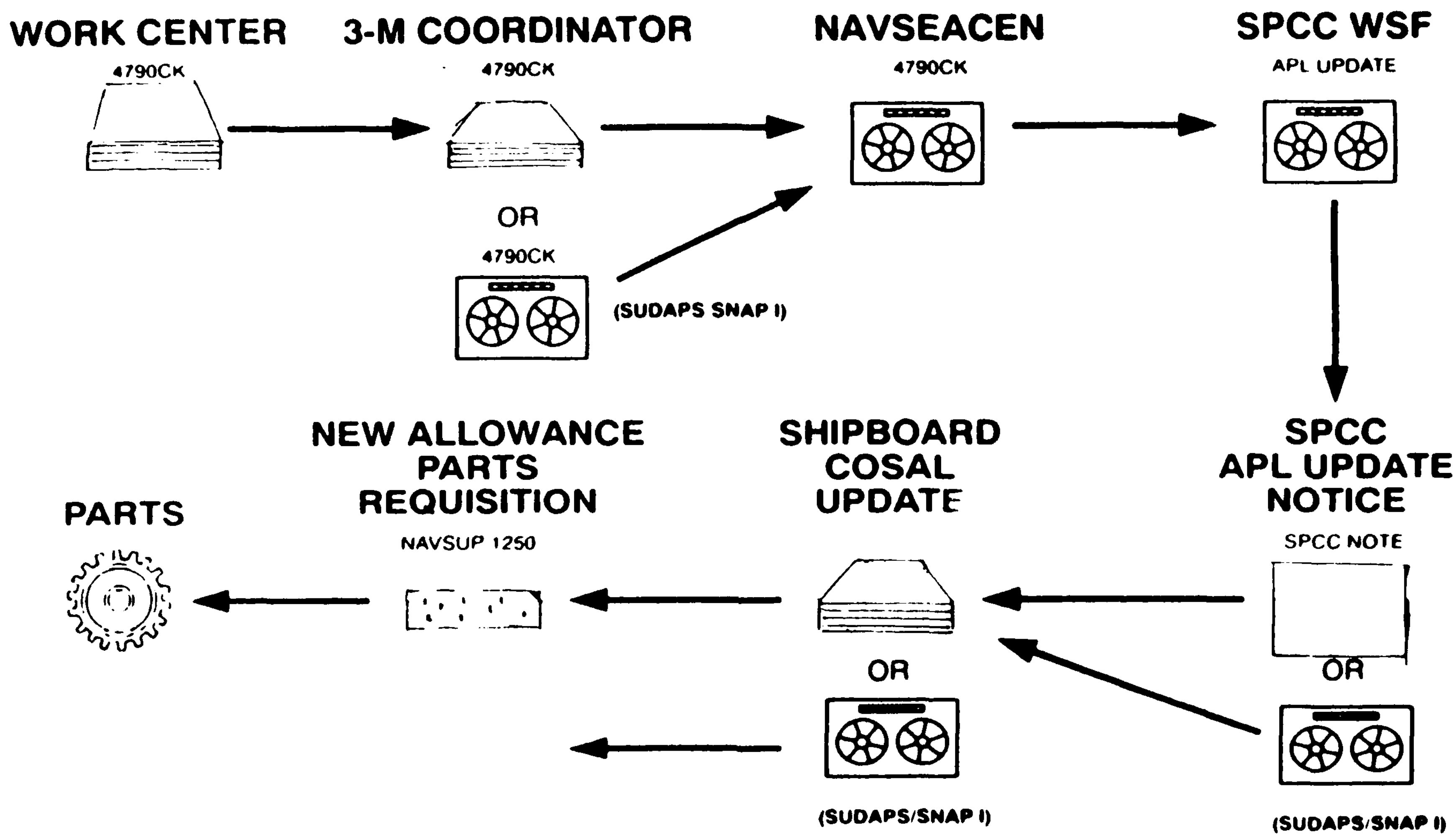

FIGURE 5-1

PROPOSED CONFIGURATION CHANGE SYSTEM

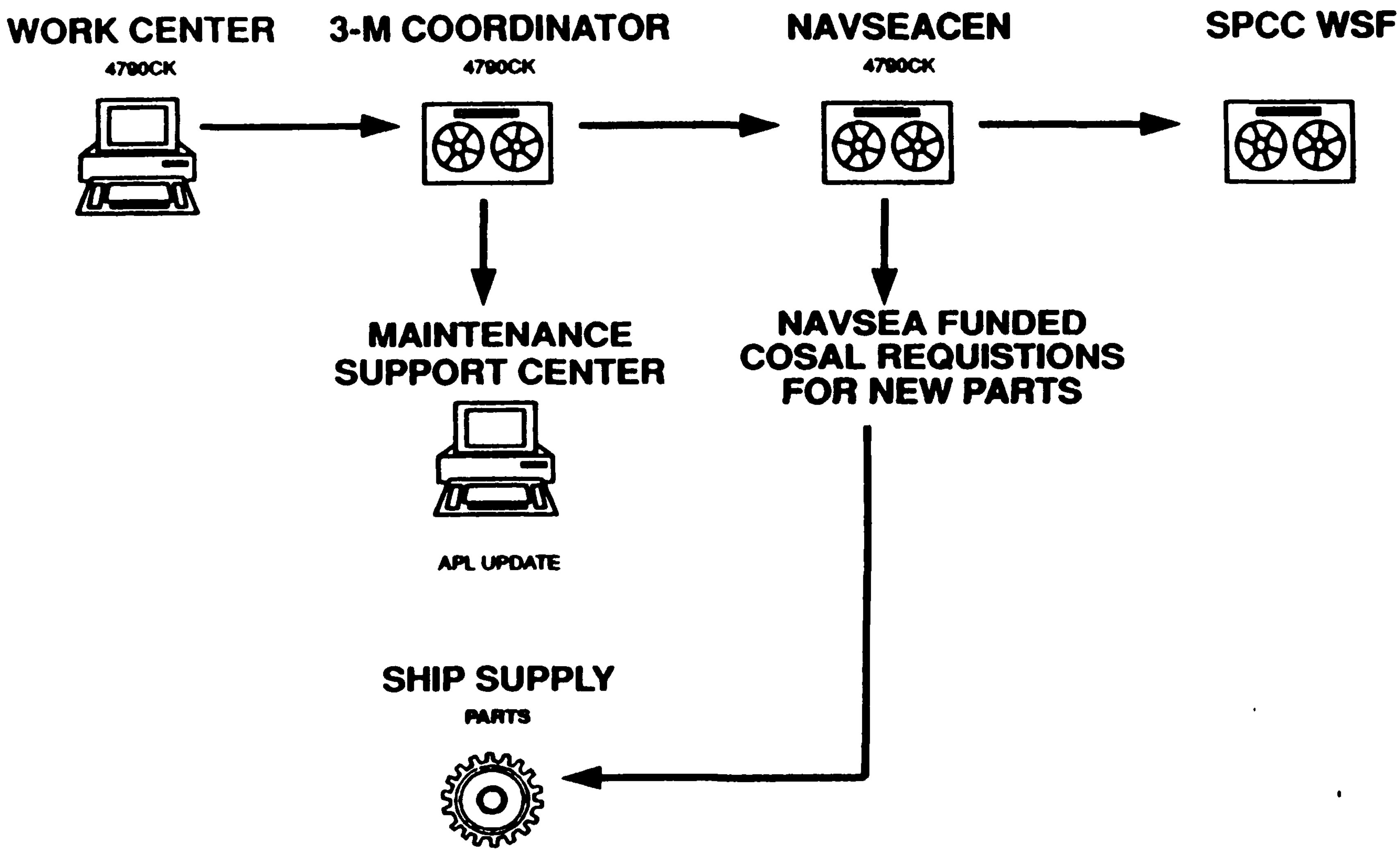

FIGURE 5-2

personnel skills test equipment and repair parts carried onboard.

Supply and financial systems, while important to the maintenance and operation of a unit, is for a large part a by-product of maintenance requirements at the organizational level. Without an internal maintenance requirement, supply and financial support onboard a Navy organization becomes minimal.

In a descending order of hierarchy, configuration management, maintenance and then supply/financial efforts should be emphasized in the development of the "SNAP III" system.

Development of an integrated maintenance module (which would provide direct maintenance data input and output between the organizational and intermediate level maintenance organizations) is the first step in this alternate proposal. The capability should exist to allow this maintenance management module to function as an organizational level overhaul work-load scheduling and management system to replace the current Ship's Force Overhaul Management System (SFOMS).

The maintenance management module must be interactive with the user, providing maintenance scheduling and work flow models at the minimum. Data collection and analytical tools for repair part consumption as provided in the current Maintenance and Material Management (3-M) Maintenance Data Collection (MDC) system should be available to the organizational level as well as transaction reports provided to the Type Commanders and the Ship's Parts Control Center (SPCC).

The maintenance module must provide organizational level forces with the capability to develop and revise weekly, monthly, quarterly and semi-annual Planned Maintenance schedules. This capability should include Critical Path maintenance scheduling that takes personnel skill requirements, and the number of personnel and equipment availabily onboard, into account. Integration of unplanned maintenance with scheduled (PMS) maintenance, and the impact in terms of rescheduling or deferral of planned maintenance when superseded by unplanned failure maintenance, should be available.

The maintenance system should be designed to use digitized engineering and technical drawings. Efforts should be made to incorporate the Engineering Data Management Information and Control System (EDMICS) into the maintenance module design from the outset. EDMICS data should be provided to ships as it becomes available, not held until the EDMICS database is completed.

A direct maintenance-supply interface should be provided to allow complete on-line and real-time visibility of repair part status for maintenance actions. Additional maintenance-supply interfaces should include the capability of automated material requisitioning five to seven days prior to the performance of a Planned Maintenance action scheduled on the weekly PMS schedule without manual interface. This capability should include the ability to pull the required material for a particular maintenance action as a complete job, and package the material for pick-up by the work center the day before the maintenance action is scheduled.

Supply inventory management should take advantage of source data entry technology. The Department of Defense LOGMARS program provides a vehicle for data capture through bar codes on DD form 1348 issue and shipping documents as well as the material packaging. Use of bar code equipment to receive, store, issue and inventory material is one of the sources of productivity and accountability enhancements that must be included in any new supply system.

The new supply system should have the capability to group requisitions by storeroom to aid in having material delivered to the ship in containers that can be received and moved directly to a particular storeroom. An interface should be developed between the Uniform Automated Data Processing System (UADPS)/Stock Point ADP Replacement Project (SPAR) and the Naval Integrated Storage Tracking and Retrieval System (NISTARS) automated warehousing system to allow packaging of material in containers that are sized to be moved on shipboard cargo elevators. Material packaged this way can be moved much more quickly into the storerooms, with less chance of pilferage or other loss upon receipt onboard ship.

The packaging of repair parts for direct stowage into storerooms would provide increased inventory control and quicker on-load, especially for aircraft carriers. Copies of issue documents would be provided on magnetic or optical media for input into the computer system. These issue documents would be placed in a material-pending receipt file. The actual receipt of material, both those moved to storerooms, in containers, and large material not transportable by cargo elevator, would take place in the storerooms where the material will be stocked. The break-out of the cargo elevator-sized packing containers in the storerooms would allow orderly receipt of material. The material as it is received and stored in the storerooms would be recorded by bar code requirement. These receipt files would then be electronically matched against the material-pending receipt file. Documents in the material pending receipt file that are not matched by actual receipt as recorded by material storage, or issued in the case of direct turn-over (DTO) material, would be sent as exception files to the issuing activity. The issuing activity would be responsible for processing the material survey documentation via the receiving activity as is now the case.

Maintenance management when broken down into its essential elements rests on the allocation of the following resources: 1) personnel skills (rates/grade and NEC), 2) equipment, 3) material/repair parts and 4) time. These basic elements of maintenance management and maintenance scheduling remain the same throughout organizational, intermediate and depot level maintenance. These elements do not vary for aviation, submarine and surface forces. The need for completely separate aviation and surface maintenance systems should be seen as redundant.

One separate logistics system should be singled out to remain as a stand-alone system. The Trident Logistics Data System (LDS), developed to support a single weapon system, is implemented at the Trident Refit Bases Bangor, Washington, and Kings Bay, Georgia. These facilities were designed to provide total patrol-refit support for the Trident weapon system. The Trident LDS provides a model for logistics integration. Designed to provide patrol-refit cycle maintenance support, the Trident LDS provides the integration of organizational level maintenance and supply support during patrol cycles and referral of maintenance and supply support beyond organizational (skill/material) or patrol (time) capabilities to the servicing Trident Refit Base.

Chapter VI

PROPOSED INFORMATION RESOURCE MANAGEMENT (IRM) AND LOGISTICS ORGANIZATIONS

This chapter will address the need for an organizational revision of the Navy's Information Resource Manager and Logistics management structures.

*WHY IS THE CURRENT ORGANIZATIONAL PLACEMENT OF THE NAVY'S INFORMATION RESOURCE MANAGER (IRM) UNSATISFACTORY?

The current structure of the Navy's Information Resource Management program places a Flag Officer junior (Rear Admiral, Lower Half) to the Type Commanders (Vice Admiral) and Headquarter System Command (Rear Admiral, Upper Half) as the Navy's senior Information Policy director.

Even though the current structure gives the Information Resource Manager the positional authority to set Navy policy and direction for Information Systems, he is disadvantaged positionally, as well as by rank. Being two levels down in the OP-09 organization (OP-941), he does not have direct access to the Chief of Naval Operations or the Deputy Chiefs of Naval Operation platform sponsors (OP-02, OP-03, OP-05).

*WHAT IS THE RELATIONSHIP BETWEEN IRM/IS AND LOGISTICS?

What is Information? Information is a resource that has a value to the user. Management of information is a new principle that must be understood in the Navy. Data contained in Navy databases has an intrinsic value and a cost of storage. The management of this resource when viewed from this perspective is not so different as the management of physical material, i.e. supply parts. Information, or more precisely the management of information, in this context becomes a logistical resource.

The management of information is a logistics resource. This concept can be clearly seen in the Integrated Logistics System (ILS) as applied to acquisition of Major Weapons Systems. The development of the Computer Aided Logistics System (CALS) to aid in the design and development of Major Weapons Systems makes use of information as a logistics resource.

CALS and ILS are used primarily for support of tactical weapons systems. These major weapons systems developed under the guidance of the Warfare sponsors (OP-02, OP-03, OP-05), also contain non-tactical logistics systems requirements.

*WHERE SHOULD THE NAVY'S INFORMATION RESOURCE MANAGER BE PLACED?

Viewing information as a logistics resource, it makes sense that Information Resource Management should be moved to the Deputy Chief of Naval Operations for Logistics, Op-04. OP-04 himself, should be designated as the Navy's Information Resource Manager. This move of functional responsibility from OP-09 to OP-04 repositions the Navy's IRM function from a third level office with a one star admiral in OPNAV, to a three star flag officer Deputy Chief of Naval Operations.

The movement of Information Resource Management to OP-04 aligns the functional responsibility of Information Systems management with that of logistics policy and management in the Navy. The Naval Data Automation Command (NAVDAC) and Navy Regional Data Automation Centers (NARDAC) should also be moved under OP-04.

*HOW SHOULD NON-TACTICAL INFORMATION SYSTEMS BE DEVELOPED?

Non-tactical information systems for logistics, administration, personnel and training should be developed under a single program office. Many databases that require logistics data also need personnel data. Likewise, training databases need personnel and logistics data. Establishing a single program office to develop these non-tactical information systems would reduce system development and lead to system standardization in the Navy.

*WHO SHOULD DETERMINE THE FUNCTIONAL REQUIREMENTS FOR NON-TACTICAL INFORMATION SYSTEMS?

Program Sponsors for major systems should have input for functional requirements to support their projects. Design and development of a non-tactical information system should rest, however, with a single Central Design Agency (CDA).

Having only one command develop all non-tactical information systems helps eliminate duplication of logistics and administrative systems. Elimination of duplicate information system development efforts and standardization of non-tactical information systems will save information system resource dollars.

*WHO SHOULD BE THE CENTRAL DESIGN AGENCY FOR NON-TACTICAL INFORMATION SYSTEMS DEVELOPMENT?

The Navy Management Support Systems Office (NAVMASSO) should be designated as the single non-tactical information systems Central Design Agency.

*WHERE SHOULD THE NON-TACTICAL INFORMATION SYSTEMS CENTRAL DESIGN AGENCY BE PLACED ORGANIZATIONALLY?

The Navy Management Support Systems Office (NAVMASSO) should be placed under the direction of the Naval Supply Systems Command (NAVSUP). NAVMASSO was created from the Fleet Assistance Group, Atlantic, a department of the Fleet Material Support Office (FMSO).

CHAPTER VII

CONCLUSIONS AND RECOMMENDATIONS

Information is as much a resource as men and material. Various elements of the Navy are just now realizing this fact. The de-centralized management system in place in the Navy, which gives Fleet Commanders and Type Commanders considerable latitude over management issues and resources, serves with merit as attested by the Navy's ability to accomplish the operational missions in the Mediterranean and Middle East in the mid to late 1980s with resources at hand. While this system works remarkably well for operational initiatives, the Navy must recognize the funding and Information System (IS) duplication that such a system creates.

The Defense Management Report issued by Secretary of Defense Cheney in June 1989 specifically targets logistics as an area to be cut. Shipboard Non-tactical Automated Data Processing systems fall in the area of logistics as defined by DOD, Army and Air Force. To avoid major program cuts and loss of control over logistic systems, the Navy needs to reorganize its Logistics and Information Resource Management policies and organization.

The solution to the Navy's Information Resource Management problems of duplication and lack of communication among organizations is not new. Rear Admiral G.E. Moore, II, SC, USN then Vice Commander of the Naval Supply Systems Command, in 1969, gave an address at the Institute of Management Sciences in April 1969. The following quotes are taken from the June 1969, Supply Corps Newsletter, giving the text of RADM Moore's address.

> A major constraint impinging on effective system design is a general lack of awareness of the range and depth of current off-the-shelf capabilities. This problem is accentuated by a shortage of imagination and innovative thinking on the part of system designers and top level management. We design, redesign, and over design from the minuscule and extrapolate out to the total system. The result is a hodgepodge network of subsystems tied together in a rather inefficient fashion. This overemphasis on segments of the problem tends to obscure the original purpose of the system, and invariably results in the organization having to be fitted to the system, rather than the system fitting the organization's problem.
>
> Our technological forecast in information-processing provides one overriding conclusion:
>
> Quantum improvements in information-processing technology are no longer likely to be made through the brute force approaches we have been taking in the past, particularly as manifested by faster computer cycle times and more sophisticated program language repertoires. Yet, large-scale improvements are possible if we can take advantage of current and improving technology and add the missing ingredient-total communication, that is - man to man, man to machine, or machine to machine.
>
> To achieve total communications, at least four areas must be stressed:
>
> First, to exploit technology and properly utilize technological potential, user requirements must be satisfied in terms of functions performed, not procedures used to perform them. This could cause major disruptive changes and casualties among current management practices and forms of human organization, yet offers potentially great payoffs.
>
> Second, standardization of procedures, equipment, software and data elements-(oriented to function). The lack of such standardization is the major source of current data handling problems. Unfortunately such a program would create numerous casualties among vendors, programs and current policies; but this is a

> price we will have to pay or suffer an escalation of today's confusion.
>
> Third, make the gear an extension of the man. For years lip service has been paid to this concept, while a diametrically opposed policy has been pursued. Today we communicate with the machine in a manner more amenable to the machine than the man. If this extension concept is to be implemented, the machine must be prepared to converse with man through his natural senses (such as sight and hearing) in his operating mode, that is, an interactive question and answer experience.
>
> Fourth, and finally, adopt new ways of organizing the machine and systems of machines.[1]

RADM Moore's remarks of 30 years ago still have validity in today's information system environment. The need for standardization among the various existing non-tactical information systems is more important today than at the time he made his remarks. The proliferation of micro-computers in the Navy makes most any command a potential software developer. This explosion of computers and in particular, local command developed software, lacks visibility and control.

Local development of software is not itself a bad thing. However, most locally developed software systems lack adequate documentation. Once the original program developer is transferred, this software can become a ticking time bomb, ready to obliterate data that a command has come to rely on.

The recommendations that follow are designed to allow the Navy to gain control of non-tactical systems development.

A. Review, consolidate and reissue all SECNAVINST and OPNAVINST pertaining to Information Resource management. The current base instruction for the Navy's Information Resource Policy SECNAVINST 5230.10 was last issued in 1987. The Navy instruction setting Information System Life Cycle Management (LCM) was issued in 1985. Many changes in legislation and technology have taken place since these instructions were issued. The policy and procedural instructions for Information Resource Management (IRM) should be reviewed annually and updated as required.

The SECNAVINST and OPNAVINST on Information Resource Management and administration should be the standard that applies throughout the entire Navy. These instructions should prohibit the development of Information Systems by Hardware System Commands, Fleet Commanders, Type Commanders, Squadrons and individual units without prior approval by the Navy's IRM.

B. The Navy needs to establish a single database of non-tactical systems developed to date. A one time reporting directive should be issued by the Chief of Naval Operations that requires all Navy commands to report to Commander Naval Data Command (NAVDAC) any information system(s) they have developed internally or have had developed by a contractor. The directive should require that the commands send a copy of the application program to NAVDAC. Additionally, the commands need to report the system name, purpose of the system, development date and who developed the system. Further, the programming language and the Navy's rights/ownership of the system should be stated. If available, program source code and documentation should be provided to NAVDAC.

The information gained from this one-time, Navy wide survey will provide a baseline of existing non-tactical information systems in the Navy.

Organizational realignments as proposed in chapter six should be given serious consideration. Moving the Information Resource Management responsibilities from OP-09 to OP-04 presents an opportunity to consolidate logistic and information systems.

SNAP III development should involve all functional managers. A piece-meal approach in developing software application programs for SNAP III will lead to the same system fragmentation that existed in the SUADPS/SNAP I environment. The system development approach should provide a maintenance based configuration management that provides integrated maintenance and supply support.

The approach of the Naval Supply Systems Command, in taking a total review of supply procedures and manning requirements for incorporation in SUADPS resystemization, defines the approach all functional managers should take in development of SNAP III. Maintenance system development should look at incorporating emergent technology and personnel trends. A total review of maintenance philosophy and requirements, such as done for Supply System requirements in the Supply Corps 2010 study, should be performed for shipboard and ashore maintenance functions.

As a follow-on to this project, a review of existing Air Force and Army unit and intermediate level maintenance and support automated systems should be performed. This review should be designed to determine if these services have existing systems that could be used by the Navy for organizational and intermediate maintenance and supply support. This follow-on study could be used by the Navy to validate the requirement to proceed with an independently developed SNAP III logistics system.

As stated in Chapter V, maintenance management rests on the allocation of four essential elements: personnel skills, equipment, material/repair parts, and time. A first step in reducing system duplication is to recognize that these elements remain constant at the organizational, intermediate and depot levels of maintenance. Only the depth or range of the elements change at the varying levels. Consolidation of maintenance management systems helps to reduce support system costs. Recognition that system standardization is needed in maintenance systems is seen in the 20 February ALNAV message form OP-94, that makes the Maintenance Resource Management System (MRMS) the standard maintenance management system for afloat and ashore ship intermediate maintenance activities.

With shrinking Defense budgets and the push by the Secretary of Defense to reduce and consolidate logistic support requirements, the need for the Navy to standardize and consolidate logistic systems grows. If the recommendations contained in this report are implemented, the first steps to reducing redundant development of non-tactical systems will have been accomplished. Additionally, the organizational realignments contained in this paper will strengthen both the Navy's Information Resource Management and Logistics organizations.

1. G.E. Moore, II, "Projected Logistics Information Systems," Remarks given to the Institute of Management Sciences in Washington, D.C. 18 April 1969 as published in Navy Supply Corps Newsletter, June 1969, pp. 10-11.

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